REMARKS

Claims 1-26 are pending. Claims 1 and 15 are the independent claims. Claims 15-26 are new and correspond to original claims 1-8 and 11-14, respectively, except that independent claim 15 further recites that the interferometric measuring of the information is done "using a single-wavelength interferometer."

Claims 1-14 stand rejected as obvious over U.S. Patent Application Publication 2001/0035959 ("Hill") in view of U.S. Patent 5,991,033 ("Henshaw"). The action concedes that "Hill does not disclose determining correction factor[s] indicative of optical gradients caused by environmental effects produced by the photolithographic exposure cycle and applying the correction factor to subsequent interferometric measurement of the stage when expos[ing] subsequent regions of the wafer or when exposing another wafer." (Action at pages 2-3.) However, the action purports to find such teachings in Henshaw, and it alleges that it would be obvious to modify Hill according to Henshaw "in order to reduce the error caused by presence of an atmosphere along the measurement path of the interferometer as taught by Henshaw in col. 3, liens 17-21." (Action at page 3.) We disagree.

The action overlooks that Hill also fails to disclose "interferometrically measuring information about a position of a microlithography stage with respect to each of multiple metrology axes *during a photolithographic exposure cycle*" and "analyzing the position information to determine correction factors ..." as recited in claim 1 (emphasis added.) To the contrary, Hill explains that the position information for his mirror characterization is taken during a "calibration mode" (e.g., see Hill at Paragraphs 43 and 44) and:

> "Once the mirrors have been characterized, error correction signals may be used when the apparatus is operated in a measurement mode to precisely position a wafer with respect to the reference frame and in turn with respect to the mask used to expose the wafer." (Hill at Paragraph 71.)

In other words, the position information used to determine the mirror correction factors in Hill is taken before, not during, a photolithographic exposure cycle.

In contrast, for example, the present application states:

> "In important feature of the invention is that the method occurs 'in-process,' i.e., it takes place during a photolithography exposure cycle used, e.g., to fabricate integrated circuits.
>
> ...
>
> The inventor has recognized that what is important to characterize is not necessarily the actual physical deformation of the stage mirror, but its 'effective' optical deformation with respect to the interferometric measurement beam(s) during the photolithography exposure cycle. This effect[ive] optical deformation includes not only physical deformations in the mirrors, but also optical gradients along the measurement beam path caused by environmental effects, such as heat and air turbulence, produced by the movement of the stage during the photolithography exposure cycle. Such optical gradients can modify the propagation properties of the interferometric measurement beams in the same way as physical deformations in the mirrors. Thus, the present method implements a mirror characterization procedure in-process to incorporate the environmental effects into the characterization. The characterization is then used to correct in-process interferometric measurements of the stage." (Application at page 4, line 30, through page 5, line 21.)

Accordingly, what is missing from Hill is that the claimed correction factors are "indicative of a local slope on a side of the stage used to reflect an interferometric measurement beam *and* optical gradients caused by environmental effects produced by the photolithographic exposure cycle," as recited in claim 1 (emphasis added), and that the claimed position information used to determine the claimed correction factors is measured "during a photolithographic exposure cycle," as recited in claim 1.

Henshaw simply does not teach what is missing from Hill.

Henshaw uses interferometric distance measurement at multiple wavelengths to determine correction factors that account for atmospheric turbulence. (See, e.g., Henshaw at col. 3, lines 28-32.) He does not determine correction factors that *also* account for stage mirror imperfections. Moreover, there is nothing in Henshaw to suggest that a mirror characterization technique such as that described in Hill should be

carried out "in-process" (i.e., during a photolithographic exposure cycle) as described in the present application.

Even assuming, for the sake of argument only, that there is some motivation to modify Hill according to Henshaw, the only reasonable modification would be to calibrate the stage mirror imperfections as taught in Hill (i.e., prior to any photolithographic exposure cycle) and thereafter separately account for atmospheric turbulence using the multiple-wavelength technique described in Henshaw. But this is not what is claimed.

To the extent the Examiner believes some other modification relevant to the claim 1 is possible, we respectively ask the Examiner to point to support in the cited prior art for how the respective techniques of Hill and Henshaw can be combined, why one of ordinary skill in the art would do so, and why that person would know how to do so.

Accordingly, we ask that the obviousness rejection of claim 1 and the claims that depend from it (claims 2-14) be withdrawn.

New independent claim is similar to claim 1, but further recites that the interferometric measuring of the information is done "using a single-wavelength interferometer." Accordingly, independent claim 15 and its dependent claims distinguish the cited prior art for the same reasons as set forth above, and they also distinguish the cited prior art because rather than use "a single-wavelength interferometer," as recited in claim 15, Henshaw uses *multiple* wavelengths to determine correction factors that account for atmospheric turbulence. See, for example, Henshaw at col. 3, lines 28-32, and col. 19, lines 32-36.

In view of the above, we ask that the application be allowed.

Enclosed is a $300.00 check for excess claim fees and a $120.00 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050, referencing Attorney Docket No. 09712-208001.

Respectfully submitted,

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